

AN INTRODUCTION TO COMPUTER-BASED MODELLING TECHNIQUES

LYNN ZELMER

<http://www.zelmeroz.com>

As presented at the 10th Australian Narrow Gauge Convention, 23 – 24 April 2011
The Workshops Rail Museum, Ipswich, Queensland

The clinic provides an overview of some computer-based techniques used in the design and development of railway models. It is primarily aimed at the experienced modeller who has yet to use a computer in his modelling but has two goals: promoting techniques that extend our modelling potential might also entice potential computer-literate modellers to the hobby.

The clinic will review some of the techniques I've discussed in recent Narrow Gauge Down Under articles and extend the discussion to other computer-based modelling techniques practised by the worldwide CaneSIG and narrow gauge modelling communities. This paper briefly summarises the clinic and gives some starting points for follow-up.

Card Modelling

Card modelling is perhaps the easiest of the computer-based techniques for the average modeller to understand and exploit. It involves drawing several views of an object to be modelled, adding colour or texture, separating the views into component groups required to make a physical model, printing the result on card or paper, and assembly.

Pre-computer we would have worked with drawing pen, coloured pencils or inks, and a photocopier. Commercially the process would have been similar, except that the final model was typically printed on light card and distributed in soft cover booklet form with several related models... remember the US wild west and English building kit booklets (and the cereal packet models)!

My computer-based development process is very similar to the pre-computer mode: I 'draw' with an electronic pencil and use digital photographs of walls and similar surfaces to colour, or texture, the model.

The computer allows me to easily duplicate and modify components for variety or to create extra parts for the multiple layers that give 3D depth. I print the resulting pages on 210 gsm card using a colour inkjet printer. Components are cut apart with a biological scalpel (or single-sided razor blade) and assembled using white wood glue.



Original inspiration and one wall of the HO/O scale Queensland Cottage kit which forms the basis of this convention's 'Bash a Cottage' competition. Jim Fainges original drawing, author's kit drawing using Clever Models plc timber and iron textures.

Over time I've collected modelling parts: doors, windows and details that can be used in future projects. As an extra bonus, I often end up with a 'kit' in pdf format that I upload to share with other modellers on the web.

The computer allows you to incorporate custom signage and, once you learn some basic computer skills, you can modify existing card kits to create your own unique, high quality models. Card models can also be used for quick mock-ups for your favourite modelling materials or to fit a particular space on your layout.

Tools required: Basic models can be created with the free 'paint' and photo management software that comes with your computer or digital camera.

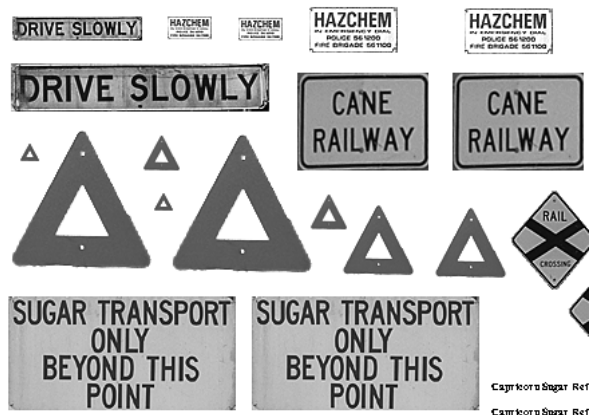
More sophisticated software uses 'layers' to separate drawings from textures. Model railroad specific software and some 3D modelling tools can also be used to create card models.

Custom Decals

Modellers have been creating their own decals for many decades but this was made easier a few years ago when sheets of decal paper became available through *Walthers*, *Micro-Mark* and others. These sheets can be used with most laser printers, colour photocopiers and even some ink-jet printers.

My first decals included computer-prepared text plus safety and sugar industry specific signs. I printed them on photo quality paper for a local office supply store to transfer onto a sheet of decal paper using their colour photocopier. Today I would simply take them a memory stick or CD.

Capricorn Sugar Refinery CSR Capricorn
Capricorn Sugar Refinery CSR Capricorn



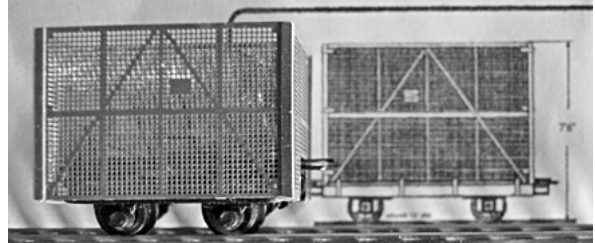
Molasses Molasses Molasses Molasses
Bulk Sugar Bulk Sugar Bulk Sugar

Part of the author's HO/O scale Capricorn Sugar decal sheet with red triangles and yellow signs. Most signs were all created by isolating them from digital photos, others were resized from signs downloaded from the web.

Tools required: Text and/or image software to develop the page to be printed. If text only, a word processor will be adequate, otherwise any image manipulation software that can isolate parts of an image, resize/transform them and combine several onto one page.

Etching and Laser Cutting

Etching sheet metal and laser cutting are 2D applications, requiring drawings of each part to be etched or cut. Advantages include thin sections and accurate cuts, either part way or completely through the material.



An experimental HO_n30 etched brass cane bin created by CaneSIG's Don Fraser and built on a Roco underframe. Don Fraser photographer.

The type of material used determines the depth and width of cut. Brass is commonly used for etched models, thin plywood for laser cut models.

Materials required: The drawings required can be created by hand, or with any computer-based drawing tool.

Chemicals, etc., for brass etching are available from electronic stores for home use or drawings can be sent to on-line or local etching services. On-line and local services can do laser cutting, although you might have to source the modelling grade plywood yourself.

Rapid prototyping

Rapid prototyping is a relatively new process for developing solid objects using a computer printer. The process requires 3D image files and builds up a shape by repeatedly depositing layers of plastic or other material until the object is completed.



Chuck Doan's half inch scale light fixture created by rapid prototyping. Chuck Doan photographer from his on-line blog.

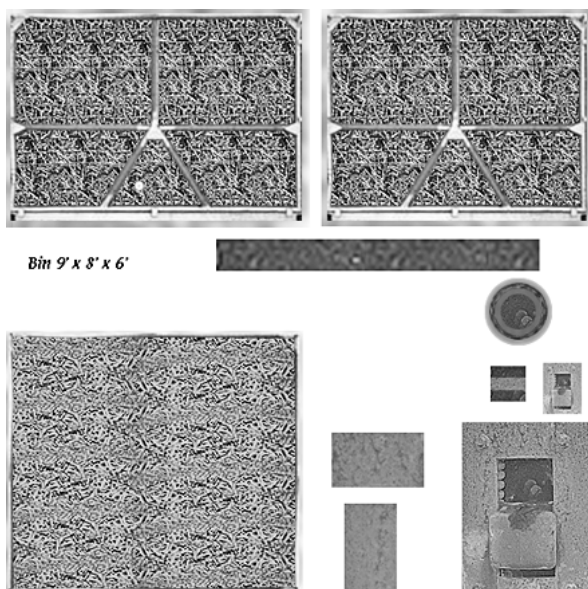
The resulting model can be painted and used on its own or as a casting master, etc.

Materials required: Objects can be drawn with a variety of 3D software packages but the result must be output in a specific file format and checked for conformity or the printing process can fail.

RP printers are expensive enough that a service bureau, quite possibly overseas, is used for printing the model.

Simulations and 3D Modelling

Simulation technology goes back at least as far as WWII and pilot training. Those simulators used aircraft mock-ups, sound, motion pictures and physical movement to create a realistic environment. More recent technology often substitutes computer generated images (3D animations) for live photography. As current animated films demonstrate, this can be very realistic but image production is time consuming.



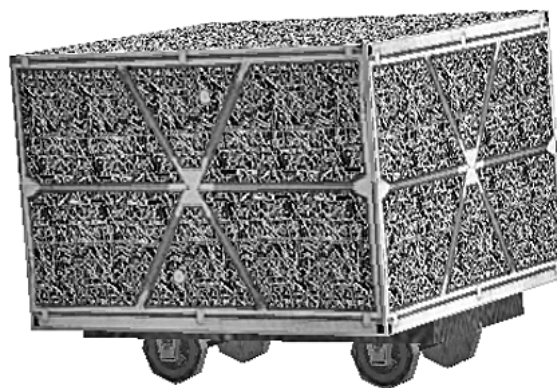
Reduced copy of the bmp-type file which, in colour, is used by the simulation software to texture a loaded cane bin. Author's drawings.

Microsoft's *TrainSim* was an outgrowth of their home computer-based aircraft simulator software but never had as wide a market. However *TrainSIM* allows users to create and exchange their own track networks (routes), locomotives and rolling stock.

The Australian developed *Trainz* software uses a similar 3D modelling structure and was originally aimed at the model railway market, rather than gamers.

Either creates a virtual railroad empire using ready-to-run or homemade components (routes, rolling stock or locomotives). The *Trainz*

software is even available for use on e-book type platforms, allowing trains to be operated anywhere as long as the batteries remain charged.



Screen capture image of an early iteration of the cane bin resulting from the author's bmp-type file (left). The bin still needs a coupling mechanism, sits too high off the ground for realism, and for some reason mirrors the bottom half to the top half of the bin, rather than using the correct side and end images.

Tools required: Operating the simulated railway requires a computer and the *TrainSIM*, *Trainz* or other user level software.

Learning to use 3D image software is harder than for 2D drawing or photo manipulation tools. More user friendly 3D modelling tools have recently become available and may make it possible for relative novices to easily develop add-on 3D models.

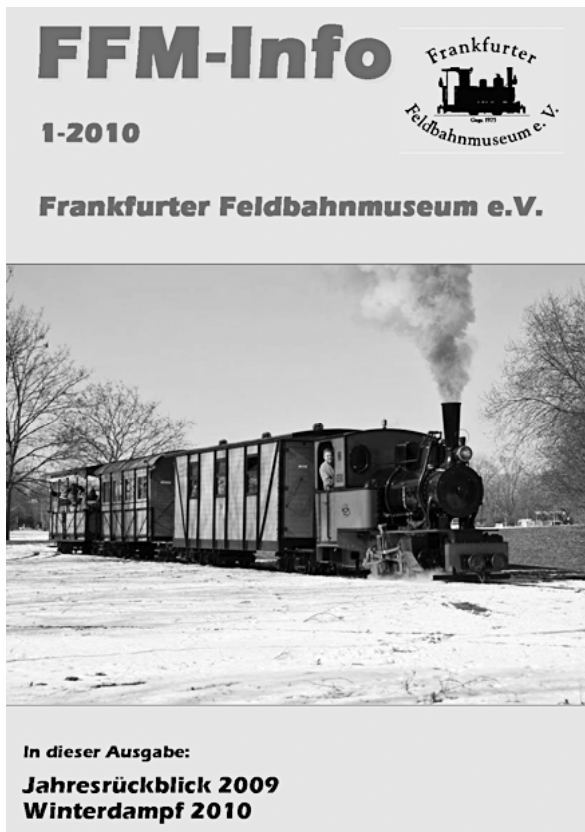
Internet Research

Most modellers are likely familiar with e-mail based discussion groups and web-based services that allow reader comments and other input. One example is the *Yahoo* ausnarrowgauge discussion group, helping modellers and railfans exchange information related to Australian narrow gauge railways.

Google Maps has been used by both serious railfans and modellers to locate current and abandoned rail infrastructure. Topographical maps for a particular location and era may be more accurate and easier to use, but they are often no longer available for a particular era or fail to show long-abandoned lines. *Google Maps*, on the other hand, are available to anyone with a computer, and comparing satellite and topographical views can often give a reasonable result.

While *Google* and other search engines can be used to obtain a variety of answers to specific queries, they can also provide access to maps, images, drawings and other information useful in modelling. Many of the textures, signs and

logos that I use in my modelling, for example, have been adapted from materials downloaded as a result of a *Google* search.



FFM-Info from Frankfurter Feldbahnmuseum is just one of many newsletters of interest to narrow gauge modellers distributed via the Internet.

Most rail heritage and historical groups now post copies of their newsletters and even other publications on-line for free download. Many model publications now have on-line versions and some, such as *Model Railroad Hobbyist*, are on-line only.

Tools Required: Computer, Internet connection, web browser software and common sense to separate the 'wheat from the chaff'.

Acknowledgements and References.

CaneSIG and NGrail contributors have made their images and other resources available for the non-commercial use of modellers. Copyright © remains with the original contributors and their support is freely acknowledged.

In particular, my thanks to Jim Fainges, Ron Aubrey and Bill Blannin for their inspiring card modelling; and Jeroen van der Schaaf and Mark Kendrick for providing the rapid prototyping samples and tips.

<http://www.zelmeroz.com/CaneSIG>
<http://www.zelmeroz.com/ngrail>

Australian narrow gauge discussion group:
<http://groups.yahoo.com/group/ausnarrowgauge>

Card kits and textures: www.clevermodels.net
and <http://www.cgtextures.com>

Frankfurter Feldbahnmuseum newsletter:
<http://www.feldbahn-ffm.de/Seiten/FFM-Info/ffm-info.htm>

Google SketchUp, a 3D modelling program that is meant to be easier to use than other 3D CAD programs: <http://sketchup.google.com/>

ModelBuilder software from Evan Designs, a dedicated drawing package for structure builders:
<http://www.modeltrainsoftware.com/model-builder.html>

Model Railroad Hobbyist magazine (free on-line monthly, albeit very US-oriented):
<http://model-railroad-hobbyist.com/>

Rapid prototyping services:
<http://printapart.com> &
<http://www.shapeways.com>

TrainSIM community (files, forum, promotions, etc.): <http://www.trainsim.com/>

Trainz products, forums, etc.:
<http://www.trainzportal.com/>
<http://24ngtrainzers.webs.com/> and
<http://www.30ng.webs.com/>

Train games and train simulators:
<http://www.railserv.com/computers/>


Zelmer, Lynn (2011). *Modelling in Card -- Scratchbuild a Queensland-Style Cottage*, and *A Queensland Cottage -- From Model to Card Kit*, **Narrow Gauge Down Under**, 40 & 41.

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at The Workshops Rail Museum, Ipswich

Lynn Zelmer: An Introduction to Computer-Based Modelling Techniques

An Introduction to Computer-Based Modelling Techniques

Lynn Zelmer
CaneSIG Coordinator




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Lynn Zelmer: An Introduction to Computer-Based Modelling Techniques

The presenter...

- Computer literate, photography hobby
- Regular contributor to NGDU, NG & Qld model conventions but also isolated
- HO/HOn3/HOn30 --> On30/SM32; logging --> Qld cane
- Hand laid track; kits, scratch building; DC
- CaneSIG & web
- 3D for NG TrainSIM
- New: Photo-realistic card models/kits
- What other useful techniques?




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This presentation...

- Card modelling
- Custom decals
- Etching and laser cutting
- Rapid prototyping
- Simulations & 3D modelling
- Internet research
- Extend our potential & entice computer-literates to modelling
- Personal/plagiarised experience
- Techniques & required tools




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Card modelling

- Traditional: outline with block colours
- Interim: add layers, more detail, shading
- Photo-realistic textures
- Queensland cottage (right) inspired by Jim Fainges' drawings in 1990s Turntable newsletter




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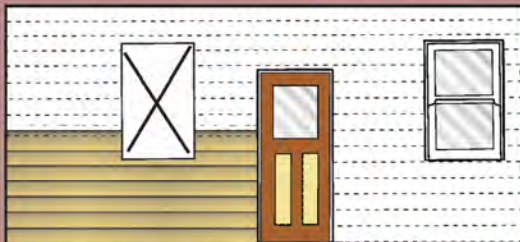


Detail from O scale Queensland house, hand drawn and shaded, distributed by Ron Aubrey




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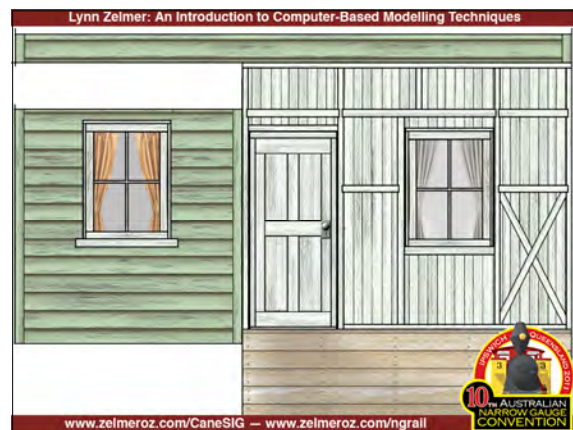
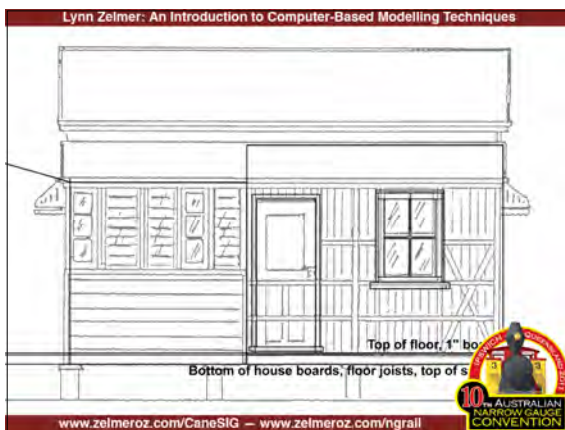
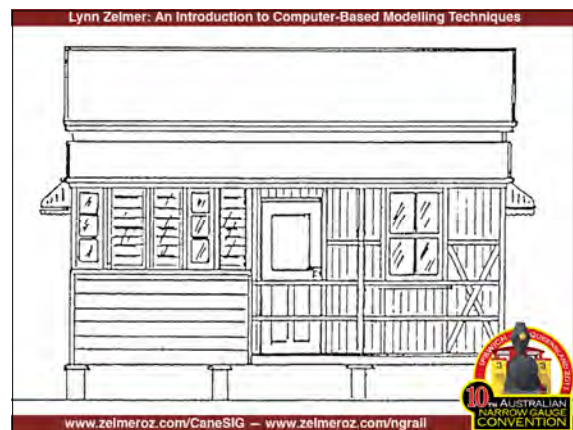


Computer-drawn kit: Mock-up of partially assembled wall from Jim Fainges' 'Fettler's cottage'. Shaded 'weatherboard' is cut into strips and applied to the wall outline with an overlap using the printed guidelines to keep them straight; doors and windows are also layered for the 3D effect. Weathering can be done with coloured chalks, etc.

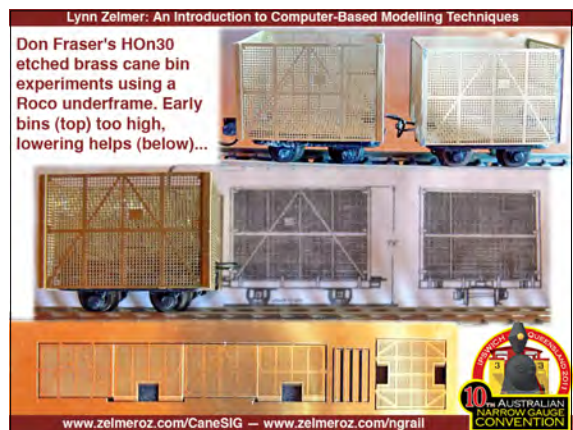
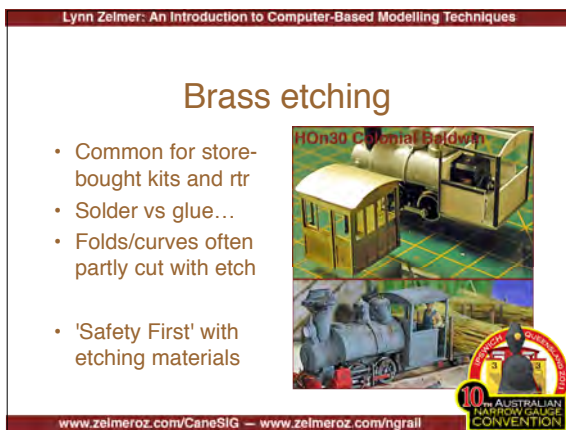
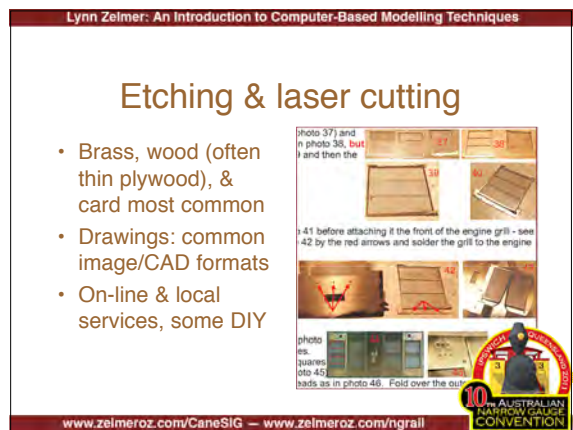
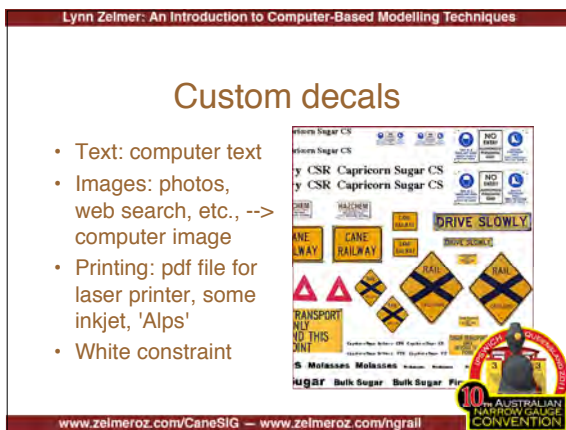
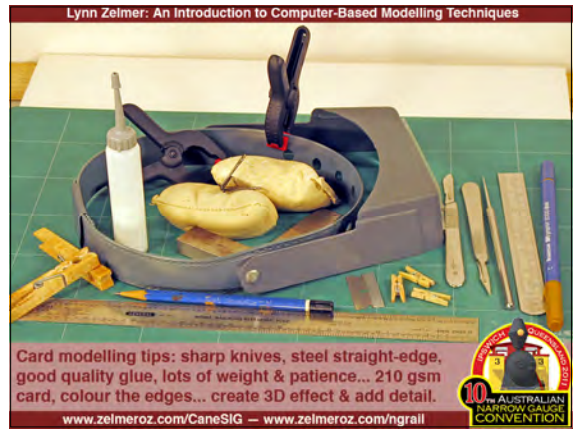
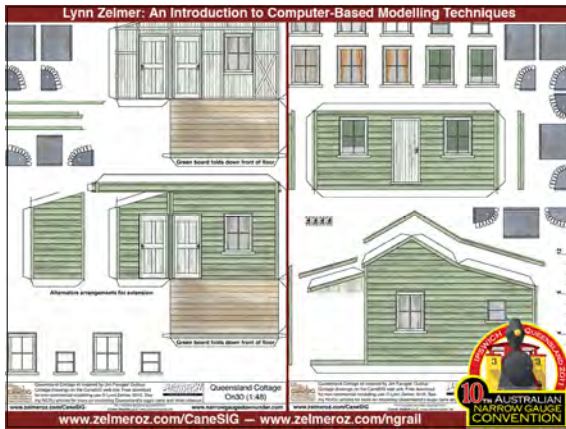


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Laser cutting

- Commercial laser cut models common
- Drawings for the burn need frets...
- Local services may lack ply, etc.
- Can paint while still on frets, but stains show burn marks



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Simulations & 3D modelling

- Industry (training, safety) & hobby use
- Film/video vs computer models
- Basic animation skills more common among youth
- Rapid prototyping for model building



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Tsehum Grist Mills: On30 (lower) & On18 (2' x 4' table)

Layout planning: Brian Wilson of Victoria, BC, started with conventional, then coloured, track plans in Photoshop, then used Google SketchUp to 'lift' segments into a 3D image. He completed the image in Photoshop by smoothing out the terrain as it might appear when modelled.

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Models for Microsoft Train Simulator (TrainSim), (Abacus TrainSim Modeller software), nominally 28" gauge to fit UK narrow gauge track. Model files 512 x 512 px. Large models need several image files, with corresponding slower display and operation.

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Trainz screen capture from Ray Steven's Isis Mill layout (Bundaberg 2004). The loco and cane bins are 'models' and can be 'reskinned'.

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Trainz screen capture from Ray Steven's Isis Mill layout (Bundaberg 2004). Some items are models, others are essentially background wallpaper.

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amabilis

From the amabilis on-line Gallery of Narrow Gauge MSTs train simulator models using narrow gauge track...

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Drive your train with realistic throttle, brake, reverse, and controls, plus 34 programmable buttons. RailDriver™ Desktop Cab Controller — feel like you're driving a train, not a computer.

Allows engineer's viewpoint, if good cab design...

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Similar computer techniques and files are needed for simulators and computer manufacturing.

Attention to function and detail is critical: while a model may look good enough for screen use, valve gear, etc., must also work properly!

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3D ...commercial/hobby

- Faster route from design to production
- Increased detail with new manufacturing techniques (eg pattern making)
- Easy to change for railway-specific models/variations

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Rapid prototyping

- Requires 3D models
- Variety of materials
- Prototype, casting masters or small scale production
- On-line and local production
- Jeroen van der Schaaf (Holland) drawing and HO30 model

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Jeroen van der Schaaf (Holland) used Greg Stephenson's Handbook article (CaneSIG) as a starting point for his HO30 wholeshtick cane trucks.

Koala Creek

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RP Materials

- Black detail: Shay spark arrester, SAR L class loco parts, O&K Mallet dome
- ABS plastic: Long underframe
- Transparent detail: GE cab
- Stainless steel w bronze: freelance log bogie wheels
- High-res UV cured polymer: HO30 cane bins
- (Shapeways and Printapart)



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Chuck Doan's first half inch scale 3D part: 16" lamp shade, etc.

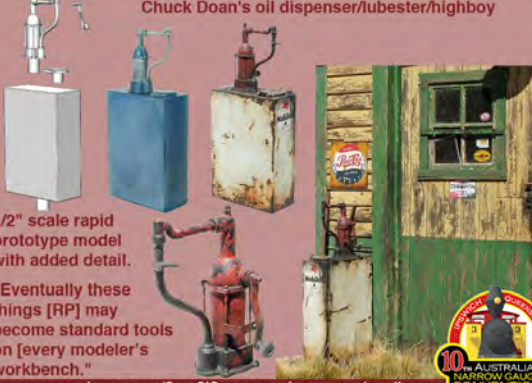
Modelled, printed, sanded, painted and installed within a week... much of the time required being for mailing of the part from PrintaPart.com.

"...seems to hold paint very well, and ACC or epoxy works too (it's not a solventable glue material)..."

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Chuck Doan's oil dispenser/tubester/highboy



1/2" scale rapid prototype model with added detail.

"Eventually these things [RP] may become standard tools on [every modeler's] workbench."

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Internet research

- Web search, refine terms, bookmark
- E-mail queries & discussion lists
- My best source of modelling ideas/tips
- Respect copyright & give credit to source
- Museums, libraries, historical groups, special interests, modellers, vendors & commercial sites
- Photo/video sharing
- Blogs & social network (eg YouTube)


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Search engines often result in millions of 'hits'. While it is possible to refine your search, many hits will be irrelevant.

Special interest sites may have more useful information but the organisation may be eccentric.

Practice should give you better skills and more frequent positive (useful) hits.



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Newsletters, etc...

- Australia & overseas
- Most free, some \$\$\$
- Subscribe, e-mail notice or collect
- Other downloads incl. plans, photos...
- Newsletter: www.feldbahn-fm.de/Seiten/FFM-Info/ffm-info.htm



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